EXHIBIT E

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Jason Sterne et al.
For	:	METHOD AND SYSTEM FOR USING A QUEUING DEVICE AS A LOSSLESS STAGE IN A NETWORK DEVICE IN A COMMUNICATIONS NETWORK
Serial No.:	:	11/377,578
Filed	:	March 17, 2006
Art Unit	:	2419
Examiner	:	Hong Sol Cho
Att. Docket	:	ALC 3229
Confirmation No.	:	5342

AMENDMENT UNDER 37 C.F.R § 1.111

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Non–Final Office Action dated January 6, 2009, please amend the above-identified application as set forth below:

CLAIM AMENDMENTS begin on page 2 of this paper.

REMARKS/ARGUMENTS begin on page 12 of this paper.

CLAIM AMENDMENTS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently Amended) A method for incorporating a queuing device as a lossless processing stage in a network device in a communications network, comprising:

monitoring a depth of a queue in the queuing device, the queue for receiving packets from an upstream device within the network device, the queuing device acting as a discard point by discarding packets when the queue is full;

~~and,~~ if the depth passes a predetermined threshold, sending a message to the upstream device to reduce a rate at which packets are sent to the queuing device to prevent the queue from filling and thereby preventing packet discarding and loss by the queuing device; and

sending a message reporting the depth of the queue to the upstream device to thereby enable the upstream device to determine whether to reduce or increase the rate at which the upstream device sends packets to the queuing device.

2. (Currently Amended) The method of claim 1, ~~and~~ further comprising, if the

depth drops below the predetermined threshold, sending a message to the upstream device to increase the rate at which packets are sent to the queuing device.

3. (Canceled)

4. (Original) The method of claim 1 wherein the monitoring further comprises comparing a rate at which packets enter the queuing device to a rate at which packets exit the queuing device.

5. (Original) The method of claim 1 wherein the network device is a router, switch, or gateway.

6. (Original) The method of claim 1 wherein the upstream device is another queuing device.

7. (Original) The method of claim 1 wherein the queuing device is a network processor or traffic manager.

8. (Original) The method of claim 1 wherein the packets are at least one of

Internet Protocol ("IP") packets, multiprotocol label switching ("MPLS") packets, asynchronous transfer mode ("ATM") packets, and frame relay packets.

9. (Currently Amended) A system for incorporating a queuing device as a lossless processing stage in a network device in a communications network, comprising:

a processor coupled to the queuing device;

and, modules executed by the processor, the modules including:

a module for monitoring a depth of a queue in the queuing device, the queue for receiving packets from an upstream device within the network device, the queuing device acting as a discard point by discarding packets when the queue is full;

~~and,~~ a module for, if the depth passes a predetermined threshold, sending a message to the upstream device to reduce a rate at which packets are sent to the queuing device to prevent the queue from filling and thereby preventing packet discarding and loss by the queuing device; and

a module for sending a message reporting the depth of the queue to the upstream device to thereby enable the upstream device to determine whether to reduce or increase the rate at which the upstream device sends packets to the queuing device.

10. (Currently Amended) The system of claim 9, ~~and~~ further comprising a module for, if the depth drops below the predetermined threshold, sending a message to the upstream device to increase the rate at which packets are sent to the queuing device.

11. (Canceled)

12. (Original) The system of claim 9 wherein the module for monitoring further comprises a module for comparing a rate at which packets enter the queuing device to a rate at which packets exit the queuing device.

13. (Original) The system of claim 9 wherein the network device is a router, switch, or gateway.

14. (Original) The system of claim 9 wherein the upstream device is another queuing device.

15. (Original) The system of claim 9 wherein the queuing device is a network processor or traffic manager.

16. (Original) The system of claim 9 wherein the packets are at least one of Internet Protocol ("IP") packets, multiprotocol label switching ("MPLS") packets, asynchronous transfer mode ("ATM") packets, and frame relay packets.

17. (Original) The system of claim 9 wherein the system is implemented within the queuing device.

18. (Original) The system of claim 9 wherein the system is implemented within a general purpose processor within the network device.

19. (Original) system of claim 9 wherein the system is implemented with a field programmable gate array ("FPGA") within the network device.

20. (Original) The system of claim 9 wherein the system is implemented within a network management system ("NMS") coupled to the network device over the network.

21. (Currently Amended) A method for incorporating an integrated queuing and

packet processing device as a lossless processing stage in a network device in a communications network, comprising:

monitoring a depth of a queue in the integrated device, the queue for receiving packets from an upstream device within the network device, the packets from the upstream device including packets having different priorities arbitrated by the upstream device, the integrated device acting as a discard point by discarding packets when the queue is full;

if the depth passes a predetermined threshold, sending a message to the upstream device to reduce a rate at which packets are sent to the integrated device to prevent the queue from filling and thereby preventing packet discarding and loss by the integrated device, wherein a rate at which data is sent to the integrated device differs from a rate at which data is sent from the integrated device due to packet processing within the integrated device; and

sending a message reporting the depth of the queue to the upstream device to thereby enable the upstream device to determine whether to reduce or increase the rate at which the upstream device sends packets to the integrated device.

22. (Currently Amended) The method of claim 21, ~~and~~ further comprising, if the depth drops below the predetermined threshold, sending a message to the upstream device to increase the rate at which packets are sent to the integrated device.

23. (Canceled)

24. (Original) The method of claim 21 wherein the monitoring further comprises comparing the rate at which data is sent to the integrated device to the rate at which data is sent from the integrated device.

25. (Original) The method of claim 21 wherein the network device is a router, switch, or gateway.

26. (Original) The method of claim 21 wherein the upstream device is another integrated device.

27. (Original) The method of claim 21 wherein the integrated device is a network processor or traffic manager.

28. (Original) The method of claim 21 wherein the packets are at least one of Internet Protocol ("IP") packets, multiprotocol label switching ("MPLS") packets, asynchronous transfer mode ("ATM") packets, and frame relay packets.

29. (Currently Amended) A queuing device for incorporation as a lossless processing stage in a network device in a communications network, comprising:

a processor coupled to a queue, the queue for receiving packets from an upstream device within the network device;

and, modules executed by the processor, the modules including:

a module for monitoring a depth of the queue, the queuing device acting as a discard point by discarding packets when the queue is full;

~~and,~~ a module for, if the depth passes a predetermined threshold, sending a message to the upstream device to reduce a rate at which packets are sent to the queuing device to prevent the queue from filling and thereby preventing packet discarding and loss by the queuing device; and

a module for sending a message reporting the depth of the queue to the upstream device to thereby enable the upstream device to determine whether to reduce or increase the rate at which the upstream device sends packets to the queuing device.

30. (Currently Amended) The queuing device of claim 29, ~~and~~ further comprising a module for, if the depth drops below the predetermined threshold, sending a message to the upstream device to increase the rate at which packets are sent to the queuing device.

31. (Canceled)

32. (Original) The queuing device of claim 29 wherein the module for monitoring further comprises a module for comparing a rate at which packets enter the queuing device to a rate at which packets exit the queuing device.

33. (Original) The queuing device of claim 29 wherein the network device is a router, switch, or gateway.

34. (Original) The queuing device of claim 29 wherein the upstream device is another queuing device.

35. (Original) The queuing device of claim 29 wherein the queuing device is a network processor or traffic manager.

36. (Original) The queuing device of claim 29 wherein the packets are at least one of Internet Protocol ("IP") packets, multiprotocol label switching ("MPLS") packets, asynchronous transfer mode ("ATM") packets, and frame relay packets.

REMARKS/ARGUMENTS

Claims 1, 2, 4-10, 12-22, 24-30, and 32-36 are pending in this application. Claims 1, 9, 21, and 29 are independent. Claims 1, 2, 9, 10, 21, 22, 29, and 30 are amended. Claims 3, 11, 23, and 31 are hereby canceled without prejudice or disclaimer, as the subject matter previously recited therein has been incorporated into the corresponding independent claims. Applicant respectfully requests the reconsideration and allowance of all pending claims in view of the following remarks.

REJECTIONS UNDER 35 U.S.C. § 103

In section 2 on pages 2-4, the Office Action rejects claims 1-18 and 20-36 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent Publication No. 2005/0185581 to Bradford et al. (hereinafter Bradford) in view of U.S. Patent No. 7,408,876 to Gupta et al. (hereinafter Gupta). Applicant respectfully traverses this rejection.

Independent claim 1 recites, in part, "sending a message reporting the depth of the queue to the upstream device to thereby enable the upstream device to determine whether to increase the rate at which it sends packets to the queuing device" (emphasis added). Independent claims 9, 21, and 29 contain similar

recitations. This subject matter finds support in the published version of the specification in, for example, paragraphs [0012], [0027], and [0038].

This subject matter provides a significant advantage for queue depth monitoring systems by enabling error recovery in the event that the system makes a mistake or that a message is lost or corrupted. See paragraph [0027]. By periodically reporting queue depths rather than only reporting threshold crossing events, the system will let the source determine an appropriate transmit rate based on the fill level of its egress queues and the downstream queues. Id. This provides error recovery in case the system reports an erroneous threshold crossing event. Id.

Applicant respectfully submits that Bradford fails to disclose, teach, or suggest the above-quoted and explained subject matter. Bradford states that "an adaptive algorithm is also provided to adjust the increment and decrement of transmit probability for each flow, together with hysteresis to increase the packet transmit rates by using packet data store to absorb bursty traffic" (emphasis added). Paragraph [0008]. This algorithm is used for the reduction of taildrop (loss of packets during severe bursts of bursty traffic) due to high queue occupancy while maintaining the advantage of hysteresis (higher transmit rates with bursty traffic). Id. This is accomplished by adjusting the transmit probability if the queue level is greater than or equal to a hysteresis threshold. See paragraph [0006]. Adjustment

of the transmit probability changes the percentage of arriving packets to be discarded. See paragraph [0006], paragraph [0030].

Thus, the system of Bradford does not send the queue depth upstream to increase the rate at which packets are sent to the queuing device if the depth drops below the predetermined threshold. Rather, Bradford adjusts the percentage of arriving packets to be discarded to maintain higher transmit rates with bursty traffic and to reduce the loss of packets during severe bursts of bursty traffic.

Gupta states, "[w]hen an egress queue 112 exceeds the upper queue threshold, the egress queue manager 106 generates congestion messages 124 to the ingress queue manager 108 to cause the ingress queues 110 responsible for causing the congestion to slow down the rates at which packets are dequeued to the congested egress queues 112" (emphasis added). Column 6, Lines 60-65. In other words, this system sends a message instructing the ingress queue to slow down the rate at which packets are dequeued, rather than sending a message reporting the depth of the egress queue and letting the ingress queue determine the appropriate action (whether to increase to decrease the rate of packets dequeued).

Accordingly, Applicant respectfully submits that the publications of record fail to disclose, teach, or suggest, "sending a message reporting the depth of the queue to the upstream device to thereby enable the upstream device to determine whether to increase the rate at which it sends packets to the queuing device," as

recited in claim 1 and similarly recited in claims 9, 21, and 29. Accordingly, Applicant submits that claims 1, 9, 21, and 29 are allowable.

Claims 2 and 4-8 are allowable based at least on their dependencies from claim 1. Claims 10 and 12-20 are allowable based at least on their dependencies from claim 9. Claims 22 and 24-28 are allowable based at least on their dependencies from claim 21. Claims 30 and 32-36 are allowable based at least on their dependencies from claim 29. As indicated above, claims 3, 11, 23, and 31 are canceled.

For at least the foregoing reasons, Applicant respectfully requests that the rejection of claims 1-18 and 20-36 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Bradford in view of Gupta be withdrawn.

Applicant respectfully notes that, should a subsequent Office Action reject the currently pending claims using a new ground of rejection, such an Office Action may not be made final pursuant to MPEP § 706.07. In particular, such a rejection will not have been necessitated by a claim amendment, as the subject matter added to the independent claims was previously recited in dependent claims 3, 11, 23, and 31.

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CONCLUSION

While we believe that the instant amendment places the application in condition for allowance, should the Examiner have any further comments or suggestions, it is respectfully requested that the Examiner telephone the undersigned attorney in order to expeditiously resolve any outstanding issues.

In the event that the fees submitted prove to be insufficient in connection with the filing of this paper, please charge our Deposit Account Number 50-0578 and please credit any excess fees to such Deposit Account.

Respectfully submitted,
KRAMER & AMADO, P.C.

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